Rocky Flats Environmental
Technology Site

Data Management Plan

for the

Environmental Restoration Program

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Data Management
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EXECUTIVE SUMMARY

This Data Management Plan implements requirements of the Department of Energy Rocky Flats Field Office (DOE-RFFO) and the Environmental Protection Agency (EPA) for environmental data management activities. The plan describes basic accountabilities for the data management process and establishes organizational responsibilities in key functional areas. A key DOE-RFFO requirement source is the Environmental Restoration Major System Acquisition (ER MSA) Project Plan and the supporting Project Management Plan. The requirements of this DOE document are translated into operational requirements by the Environmental Restoration Program Division (ERPD) Management Implementation Plan. These plans, in turn, provide requirements for all data management operational procedures. Specific data processing methods are defined in the Rocky Flats Environmental Technology Site (Site) ERPD plans, procedures, and contractual statements of work (SOW). Other applicable requirements sources are the EPA directives, guidance documents, and DOE Orders. The principal objective of these requirements is to ensure that the environmental data management process from planning through measurement, recording, evaluation, utilization, reporting, and archiving is controlled in an efficient, comprehensive, and standardized manner.

The Data Management Plan provides an overview of the requirements and accountabilities needed to ensure consistent implementation of the data management process. Key process objectives are to ensure data <u>are</u> traceable to time and place of collection and are of known quality. The Plan objective is to define consistent data management practices that simplify interfaces and that facilitate the development of a common set of software applications and a consolidated environmental database.

Section 1 of this plan defines the purpose, scope, and objectives of environmental data management. Section 2 describes the data management process and methodology within the ER Program. Section 3 defines Site data management responsibilities and organizational interfaces. Section 4 addresses data management requirements, including the internal Site procedures that implement those requirements. Section 5 discusses outputs, including on-line user interfaces, Geographic Information Systems (GIS), and Computer Aided Drafting (CAD). Section 6 provides a glossary of terms.

SECTION 1
INTRODUCTION

1.0   INTRODUCTION

The Rocky Flats Environmental Technology Site (Site) Environmental Restoration Major System Acquisition (ER MSA) Project Plan prepared by the Department of Energy Rocky Flats Field Office (DOE-RFFO) serves as the primary directive document for the Site investigations and environmental clean-up actions. Supplementary requirements documents applicable to Environmental Data Management are found in DOE Orders and EPA Directives. The Data Management Plan will implement these requirements by defining responsibilities and providing an overview of the data management process.

1.1   Background

The Site environmental monitoring and site characterization efforts produce test data to establish contamination levels in air, soil, water, sediment, and other media. These test data include analytical results for chemical, radiological, meteorological, biological, hydrological, geotechnical, and geological parameter groups. Data that support the environmental monitoring programs have been collected at the Site for many years; a significant increase in the collection of site investigation data occurred in 1988 as a result of the tri-partite Interagency Agreement (IAG) to clean up the Site. In 1990, the Rocky Flats Environmental Database System (RFEDS) was initiated as a central repository of site environmental data. The RFEDS is paired with and directly supports the output of the Geographic Information System (GIS). These systems are managed and administered by the ERPD Data Management (DM) Group. The combined RFEDS/GIS environmental data management system is capable of providing a wide variety of tabular, graphic, and geographic reports that support environmental regulatory program needs. Environmental project managers in the ERPD and the Environmental Protection Management (EPM) organizations utilize RFEDS/GIS to perform: 1) on-line tracking of field sampling activities, 2) data retrieval and extraction, 3) project management, 4) ad hoc and routine reporting, and 5) analysis and interpretations of environmental data.

On going system development activities focus on providing the following: end user output applications, systems that reduce data for outputs, integration of stand-alone environmental databases, and systems that verify the accuracy and completeness of data inputs. Recent accomplishments include development and implementation of verification programs for analytical results and validation information, and a quality assurance/quality control (QA/QC) plan and procedure for Rocky Flats Environmental Database System/Geographic Information System development. These tasks are nearing successful completion and will result in significant improvements to RFEDS maintainability, system documentation, data accuracy, and completeness. User needs and system requirements were recently assessed and documented in the "RFEDS User Requirements Analysis" document dated 1/30/95. This document describes a centralized RFEDS/GIS as envisioned by stakeholders and provides an extensive collection of desired outputs and system features.

The RFEDS system resides on a UNIX-based workstation/server located in the Interlocken Facility (Bldg 080) computer room. Data are managed on the system by the Oracle Relational Database Management System (RDBMS). Data are loaded into RFEDS, and accuracy is verified by ERPD DM staff. The information Resource/Environmental and Real Time System (IR/E&RTS) staff provides development of RFEDS applications, Oracle database administration, and the UNIX system administration. A generalization overview of the RFEDS/GIS data flow process is provided in Figure 1-1.
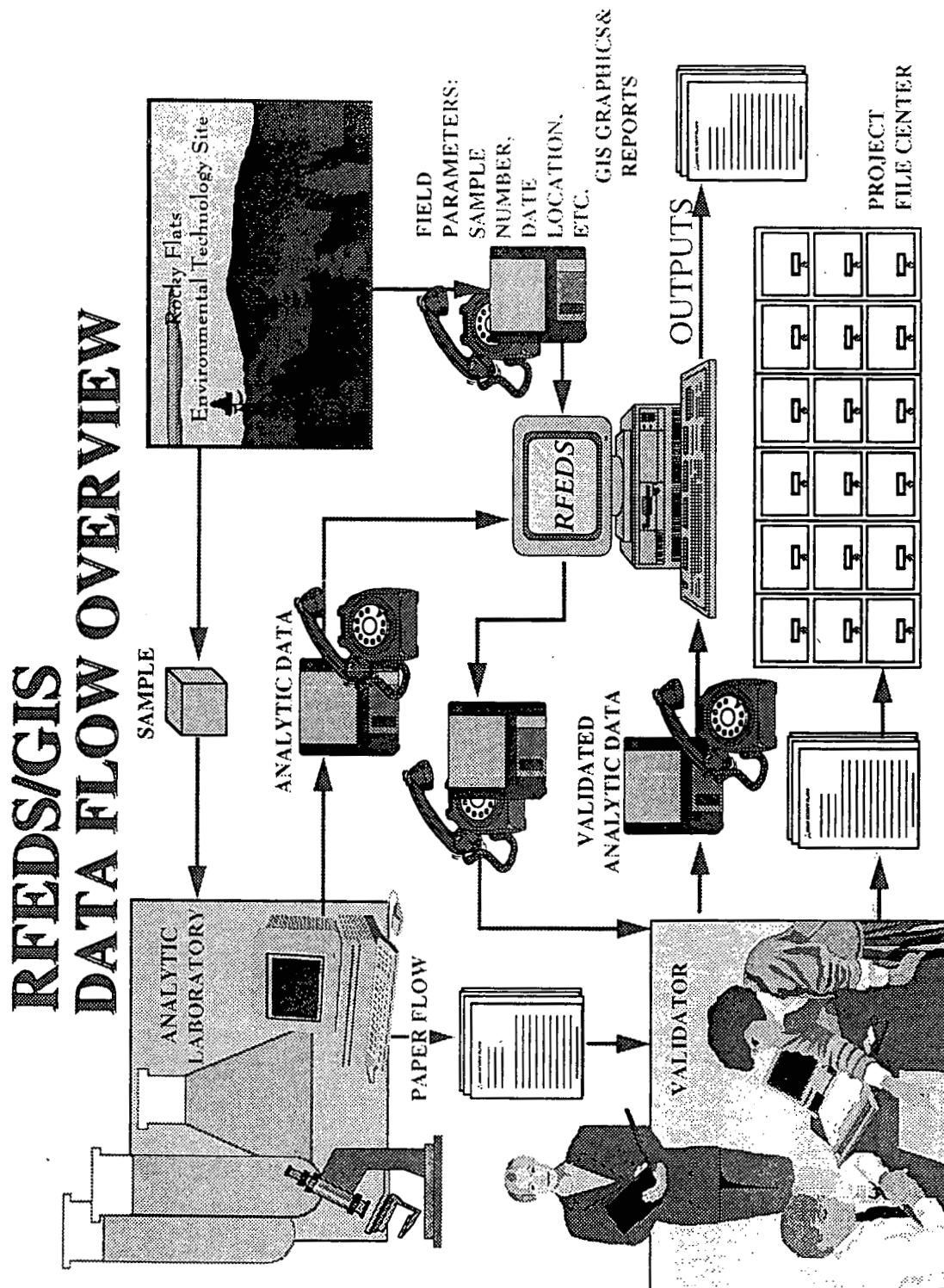
Figure 1-1. RFEDS/GIS Data Flow Overview

1.2 Purpose

This Data Management Plan supports the Site mission by defining environmental data management requirements, work processes, responsibilities, procedures, and organizational accountabilities. This is achieved by identifying the sources of data, describing data processing systems, establishing systematic procedures for QA/QC, creating a suitable database, and providing outputs (that meet project requirements to end users). The Data Management Plan also identifies and defines responsibilities for sample documentation, sample tracking, data entry, data proofing, data reporting, planning, measuring, data set reduction, and final data quality assessment. Finally, the plan provides a DM systems project schedule with milestones for key deliverable items.

1.3 Scope

Management control of data is necessary throughout the life cycle of the Data Management Plan. The life cycle phases include:

- Planning Data Requirements

- Acquiring Data

- Maintaining Data

- Evaluating Data

- Reporting Data

- Archiving Data

Each project manager defines the data types used, which typically include measurement results, standard reference tables, and records of data verification, validation, and useability assessments.

1.4 Data Inputs/Sources

The RFEDS/GIS is the key source for the Site environmental restoration and monitoring programs data. The DOE-Rocky Flats Field Office (RFFO) mandated a central site repository for environmental data; pursuant to this mandate, system and data set integration activities are in progress. Current or future data sets and programs supported by RFEDS and GIS include the following:

- Groundwater, surface water, surface water sediment, surface soil, and air monitoring

- Comprehensive Environmental Response, Compensation, and Liability Act/Resource Conservation and Recovery Act (CERCLA/RCRA) hazardous site investigation data for surface soil, surface water, groundwater, sediment, air, and subsurface soil

- Radiological ambient air monitoring

- The Site facility effluent air radiological monitoring

- Hydrogeologic/geographic/mapping data

- Real-time telemetry data for Site air and water monitoring stations

- Ecological studies (flora and fauna population surveys and contaminant impacts)

- Indicator organism toxicological data

- Meteorological monitoring and climatology.

An integrated RFEDS/GIS Data Set Model is shown in Figure 1-2.

There are five main sources of input into the environmental database. These sources consist of chain-of-custody (COC) daily entry, subcontractor field sampling deliverable entry, offsite analytical laboratory entry, onsite analytical laboratory entry, and validation entry. The following is a brief description of sources of input.

1.4.1 Chain-of-Custody Entry

Site subcontractors that perform the collection of environmental samples for all media are required to provide a copy of the shipped COC to the DM organization on a daily basis. When DM personnel receive the COC, they immediately enter the information into RFEDS.

1.4.2 Subcontractor Field Disk Deliverable Entry

RFEDS has a field data capturing program titled Datacap, which is managed and maintained by DM personnel. It resides on a microcomputer that the subcontractor uses on Site. Subcontractors are required to enter field operation information and tracking information into Datacap and transmit these data to DM once a week. DM personnel then verify the Electronic Data Deliverable (EDD) content and format using an RFEDS check routine application prior to posting to the central database.

1.4.3 Offsite Analytical Laboratory Entry

The offsite analytical laboratories provide analytical results via diskette, the Environmental Data Collection Network (EDCN), or hardcopy. DM personnel then verify the EDD content and format using an RFEDS check routine application prior to posting to the central database.

1.4.4 Onsite Analytical Laboratory Entry

Onsite laboratories transmit laboratory results entered into the Laboratory Information Management System (LIMS) via the VAX to RFEDS. The Site Environmental Protection Surface Water personnel manually enter supplemental data into RFEDS as needed. Prior to posting to the central database, DM personnel verify the EDD content and format using an RFEDS check routine application.

1.4.5 Validation Entry

The validator reviews information received by the offsite analytical laboratories and qualifies result data disposition as acceptable, estimated, or rejected. Result acceptance status is flagged by qualification code. Validation data are received via diskette, EDCN, or hardcopy. Prior to posting to the central database, DM personnel verify the EDD content and format using an RFEDS check routine application.

INTEGRATED RFEDS/GIS DATA FLOW

Data Set Model
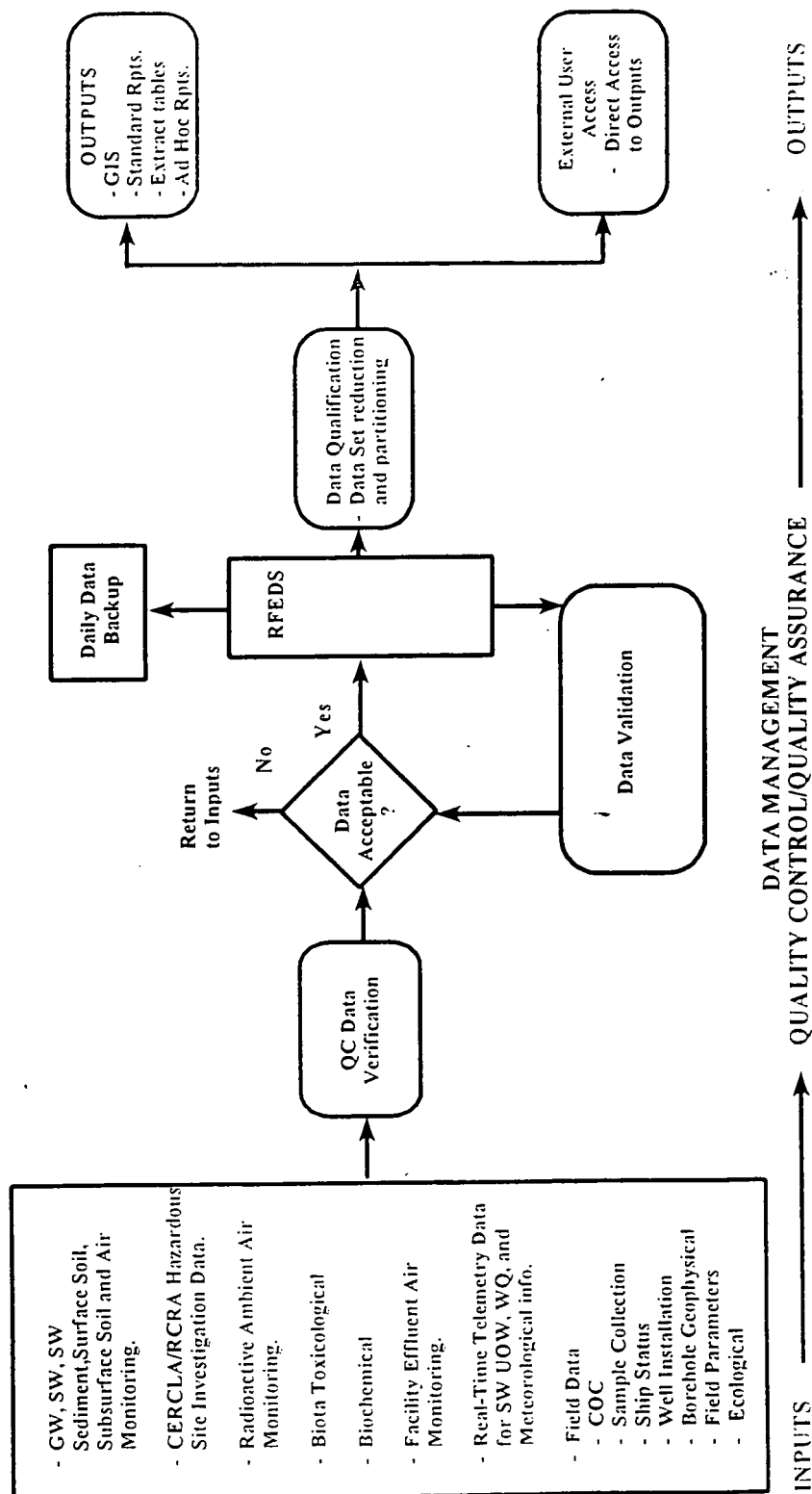
Figure 1-2. Integrated RFEDS/GIS Data Set Model

1.5 Data Processing Systems

The RFEDS production server resides on a UNIX workstation in an Interlocken facility computer room. The RFEDS development is conducted on a separate server, IBM RS/6000 Model 550 workstation. Data are managed on the system by the ORACLE RDBMS. The system and applications are configuration controlled; internal procedures require systematic development, testing, review, and authorization prior to production use of new or revised applications. The server is connected to the Transmission Control Protocol/Internet Protocol (TCP/IP) network, which uses an Ethernet backbone. The system communicates to the Site Local Area Network via a dedicated telephone (T1) connection. The system is protected from catastrophic failure and has an approved disaster recovery/security plan.

The GIS, also in the Interlocken computer room, resides on an IBM RS/6000 Model 550 workstation separate from the RFEDS development server and uses the GIS ARC Info toolset of application programs. The GIS provides maps and multidimensional graphical analysis of the extent and concentration of Site hazardous contaminants.

The ERPD DM group operates and administers the RFEDS/GIS systems for all Site environmental data collection programs and provides a single source for the following services: data entry, input accuracy verification, development of RFEDS/GIS applications, user training, data extractions and outputs, and database and UNIX system administration. In turn, environmental program managers and their staff scientists are responsible for correct and accurate interpretation and presentation of RFEDS/GIS data and outputs. This requires a systematic review and validation of data and outputs prior to presenting conclusions.

SECTION 2
DATA MANAGEMENT
PROCESS DESCRIPTION/
METHODOLOGY

2.0 DATA MANAGEMENT PROCESS DESCRIPTION/METHODOLOGY

This section provides an overview of the Data Management process, from planning through final result reporting. A generalized process flowchart is shown at the end of the section in Figure 2-1 (on pages 15-17).

2.1 Sampling and Analysis Planning

Sampling and analysis planning includes problem scoping, data requirements definition, data collection planning, QA readiness review, health and safety planning, and waste management planning.

2.1.1 Problem Scoping

Problem scoping involves site assessment, establishment of Data Quality Objectives (DQOs), and development of a conceptual model of the nature and extent of contamination at the site.

2.1.1.1 Existing Data Evaluation Previously collected environmental data reviewed by the project are inventoried and evaluated. An independent examination of the quality of previously collected environmental data is performed to determine whether it can be used (either stand-alone or in conjunction with current data collected by a project) in reaching a decision. These data typically support decisions such as risk assessment and site characterization. All reviews, conclusions, and reports are transmitted to the ERPD Project File Center.

2.1.1.2 Study Area Scoping Study areas are identified and geographically bounded in a consistent manner across projects to promote efficient reuse of historical data. An information security review of problem scoping information is required to determine the appropriate level of classification and control.

2.1.1.3 Media Exposure Pathway Identification Each project plan defines current assumptions regarding the known and suspected causes or sources of contamination, spatial distribution of contaminants and concentration levels within media, potential pathways of contaminants exposure, and potential receptors.

2.1.1.4 Contamination Risk Identification Information resulting from a risk assessment is maintained to document the potential risks and the assumptions taken into consideration during the assessment.

2.1.2 Data Requirements Definition

Project teams specify the use of the data to be collected, the decision criteria, and the acceptable decision error. These criteria are stated in the form of DQOs. DQOs will be established prior to data collection activities, during problem scoping, and for directing, planning, and providing criteria to assess the quality of project data.

2.1.2.1 Project Action Identification or Remediation Decision These statements provide the underlying assumptions and objectives upon which the decisions are based and are defined and documented in Work Plans or other program documents.

2.1.2.2 Project Data Quality Objectives For each of the discrete decision statements, requirements for specific sets of data are detailed in the DQOs, which are defined as qualitative and quantitative statements that clarify the study objective, define the most appropriate type of data to collect, determine the most appropriate conditions under which to collect the data, and specify acceptable levels of decision error that will be used as the basis to support the objective. DQOs are project specific and define acceptance criteria for individual data points, as well as the data set as a whole. They are established to ensure that the investigation data generated withstand scientific and legal scrutiny. Potential uncertainties in the data are specified, and the consequences of these errors with respect to the nature of the decision are evaluated to define severity. The DQO planning process is designed to ensure that the type, quality, and quantity of environmental data used in decision making are appropriate. It allows data users to define their data requirements and acceptable levels of decision errors in the sampling and analysis plan before the collection of data.

The seven steps in the DQO process include:

- State the Problem

- Identify the Decision

- Identify inputs to the Decision

- Define the Study Boundaries

- Develop a Decision Rule

- Specify Limits on Decision Errors

- Optimize the Design for Obtaining Data.

The Quality Assurance Addenda (QAA), as a part of the Work Plan, documents DQOs.

2.1.3 Data Collection Planning

2.1.3.1 Alternative Sampling Approaches Identification Investigators identify and discuss the relative merits of alternate sampling approaches. If necessary, a qualitative or quantitative cost/benefit analysis is conducted to assist in alternative selection. The sampling alternative that best supports the study objective within cost constraints is then selected.

2.1.3.2 Field Sampling When the sampling approach is determined, a Field Sampling Plan (FSP) is prepared that describes in detail the number of samples, locations of collection, media sampled, analysis method, sample collection volumes, and containers required. The SAP specifies the number and type of field QC samples required. The FSP is documented in the Work Plan, QAA, or other project or program guidance document.

2.1.4 Health and Safety Planning

A project-specific Health and Safety Plan is required to address all chemical, radiological, physical, and other hazards associated with field sample collection. The Health and Safety Plan must be approved, and involved personnel indoctrinated prior to the start of field operations.

2.1.5   Waste Management Planning

Investigation-derived waste streams are identified and their volumes estimated. Waste handling requirements are incorporated into the SAP to ensure a cross reference between the sample location, waste container number, waste container storage location, and sample analysis results.

2.1.6   Quality Assurance Readiness Review

The QA readiness review is conducted by a team of qualified specialists that evaluate readiness to proceed with the data collection operation. The readiness review team must, at minimum, consist of the QA representative and the Project Manager (PM) or designee. This evaluation includes review to ensure that adequate approved procedures are in place, that personnel are trained, that equipment is available and in working condition, that laboratories or other external organizations are appropriately informed and prepared to support the project, and that all involved internal organizations such as DM and the Sample Management Office (SMO) are appropriately informed and prepared to support the project. The evaluation team prepares a report of their findings of readiness to proceed. If corrective actions are required, the project may not proceed until all findings are resolved to the joint approval of the involved PM and QA representative.

2.1.7   Key Personnel, Schedule, and Milestones Identification

Key personnel, schedules, and activity milestones are identified in work plans or other approved documents and coordinated with the organizations involved in project data management.

2.2   Field Preparation

Monitoring location identification is standardized across projects to facilitate measurement data retrieval. A unique identifier code associates sample location with GIS (state plane) grid coordinates. Global positioning transponders and/or land survey techniques are specified along with equipment requirements in the FSP. Information describing the unique characteristics of a monitoring location will be recorded and stored electronically. Information regarding a necessary change to the status of a monitoring location must be recorded and stored electronically. The change will be initiated after project review and approval. Data associated with well or borehole installation, purging and development events, related geophysical measurements, and geologic strata logging are recorded and stored electronically after review, verification, and approval.

2.3   Field Data Collection

Unique sample numbers are provided to identify, track, and monitor each sample and associated data from point of collection through final data reporting. The possession and transfer of samples is documented from collection to final disposition. Analytical data documentation, to include COCs, analytical requests, and results information, is tracked from point of sample initiation through final archive. Sampling documentation is controlled from preparation and initiation to completion and is maintained in the project files. All activities in the field will be documented sufficiently to enable reconstruction of events.

Field logbooks are assigned identification numbers by the ERPD document control personnel and transmitted to the ERPD Project File Center (PFC) upon completion. All modifications to planned activities and deviations from procedures are reviewed and recorded.

2.3.1 Field Event Planning

Coordination of the field event is important to ensure that schedules are met and that there are sufficient resources present to accomplish the task. Items of coordination are training to support field events, laboratories to perform analytical work, and preparation of sample containers, coolers, and container labels.

2.3.2 Field Event Performance

When the QA Readiness Review is complete with a documented determination to proceed, the field event can begin. Data collection activities are performed in a controlled, systematic manner according to approved standard operating procedures using trained technicians, as well as approved and calibrated equipment. Collected samples are preserved as required, packaged, and shipped to the designated laboratory.

2.4 Data Review

Field data are reviewed for accuracy, completeness, and compliance with plans and procedures as soon as possible after the field event. The Sampling Team Leader reviews all documents and electronic submittals to ensure that proper procedure was used, including proper completion of field logbooks and required data collection forms and the recording of environmental conditions of the sampling event, the equipment used, and the serial numbers of any measuring and test equipment employed. If any deviation from plans and procedures was necessary, project management is informed, and the deviation is documented in field logbooks and/or nonconformance reports. Verification of positive sample traceability and representativeness is maintained through confirmation of unique sample identification numbers and proper collection and handling techniques.

To ensure that entered data are complete and of the correct format, verification check routines are built into the Field Data Capture (Datacap) program. Once the field data verifications are complete and acceptable, the data are posted into the RFEDS central database.

2.5 Analytical Data Verification

Qualified environmental chemists review laboratory data packages for compliance to DQO and Statement of Work requirements. This review typically assesses the following for each sample delivery group: proper sample preservation and COC, use of correct analytical method, appropriate method detection limit, laboratory introduced contamination, and acceptable laboratory accuracy and precision. Analytical data validation reports qualify the evaluation results and revise the laboratory deliverable as appropriate. This information is compiled into an EDD that is transmitted to the DM group.

2.6 Validated Data Verification

The analytical data validation subcontractor provides an EDD to DM. Prior to posting to the central database, DM personnel then verify the EDD content and format using an RFEDS check routine application.

2.7 Data Assessment

Measurement data are assessed for adequacy according to intended use by comparing the data with predefined acceptance criteria. A standard usability qualifier is used to identify usability based on field and analytical data review. An independent examination of the quality of previously collected environmental data is performed to determine whether it can be used, either stand-alone or in conjunction with data collected by a project, in reaching remedial decisions. The examination establishes the source of the data, the sampling design, sampling and analysis methods, and quality control data. When possible, the examination shall determine bias, precision, detection limits, and other data that would determine usability of data.

2.8 Data Usability Determination

After considering recommendations from the data assessment specialist, a final determination of data usability is made by the PM. The data usability assessment is conducted by qualified environmental chemists or specialists at the direction of the PM. The Data Assessor can be part of the project team or a third party contractor. The Data Assessor conducts a comprehensive two-part evaluations of data: (a) for conformance to DQOs, including parameters for sensitivity, precision, accuracy, representativeness, completeness, and comparability (SPARCC)and (b) for overall usability to support the intended investigation decision error objectives. This comprehensive evaluation incorporates the assessment of laboratory quality control sample performance, field quality control sample performance, and project DQO attainment to establish data usability. Data qualifiers are then assigned to indicate the data usability with respect to project requirements, and the usability report is presented to the project manager (data requestor) for review and appropriate action. The PM will make an overall project data set assessment as acceptable (meeting DQOs), usable as is (minor DQO nonconformances), or rejected (major DQO nonconformance). RFEDS must be informed by project managers when corrective actions are required, particularly if data acceptance status changes are indicated.

2.9 Records Management

All records generated as a result of project activities must be transmitted to the ERPD PFC for indexing and archival. The PM is responsible for the timely transmittal of data and records to the Project File Center. Following transmittal, ERPD Records Management personnel are responsible to index, store, retrieve, and protect records in accordance with applicable procedures and plans.

2.10 RFEDS/GIS Outputs

DM staff provide reporting services that include database extractions, ad hoc reports, standard tabular reports, and spatial analysis of contamination data. Output requests are directed to the responsible DM staff, who then create the tabular, graphic, or electronic deliverable to the users' specifications.

(B)

Data Management

1. Receives field data (including electronic COC)
2. Performs consistency/comparison checks on field data
3. Provides Error/Discrepancy Reports to PM/Sample Team Leader (STL)

Data Management

1. Corrects error/discrepencies
2. Inputs field data and COC data to RFEDS

Data Management

Receives EDD and COC
1. Verifies COC data from laboratory
(C) → 2. Performs consistency/comparison checks and makes corrections when necessary
3. Performs electronic verification
4. Provides data to validators and assessors of data

Data Validator

1. Reviews and evaluates data (electronic and hard copy)
2. Qualifies data
3. Identifies errors and makes necessary corrections to data with documentation
4. Provides validation and assessment reports to PM or designee

Data Management

Enters data and qualifiers into RFEDS

PM or Designee

1. Conducts Final Data Useability Assessment
2. Reviews and prepares reports
3. Takes corrective action if necessary
4. Transmits hard copy of data sets to records after approval

Data Management

1. Provide GIS/Computer Assisted Design (CAD) support to end user

Figure 2-1. Data Management Flow Process

PM

Submits approved Work Plan with DQO to DM

PM

Submits Sampling Inititiation Event Information to SMO/RFEDS/STL

PM

1. Verifies Document training
   (Trained to plan and procedures)
2. Submits readiness report

STL

Prepare for sampling event including:
1. Prepares bottles
2. Prepares labels
3. Obtain logbooks
   (from document control)

Data Management

Supplies:
  COCs
  Sample numbers
  Analysis codes

STL

1. Records collection data
2. Processes samples and coordinates with SMO shipping samples (inventory) to laboratories
3. Reviews field forms, completes evaluation forms, and delivers forms to Data Management
4. Coordinates completion of shipping

Data Management

1. Provides training on field data deliverables
2. Provides installation of Datacap software

(B)

SMO

1. Selects laboratories (in advance) and coordinates with STL on shipping of samples
2. Supplies rad screening
3. Provides input to laboratories on analytical clarification; provides relevant documents to DM
4. Writes Analytical SOW

(A)

Figure 2-1. (continued) Data Management Flow Process

(A)

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                        ┌─────────────────────────┐
                        │        STL/SMO          │
                        │                         │
                        │ Sends samples to        │
                        │ laboratories            │
                        └─────────────────────────┘
                                   │
                                   ▼
┌──────────────────────┐    ┌─────────────────────────────────┐
│         SMO          │    │          LABORATORY             │
│                      │    │                                 │
│ Provides verbal      │──▶ │ 1. Receives samples (with prior │
│ (followed by written)│    │    arrangement from SMO)        │
│ clarification of     │    │ 2. Verifies sample/COC data     │
│ analysis request or  │    │ 3. Returns signed copy of COC   │
│ redirection          │    │    to data management (records) │
└──────────────────────┘    │ 4. Checks statement of work     │
                            └─────────────────────────────────┘
```

Unclear / Clear

```
┌──────────────────────┐              ┌──────────────────────┐
│     LABORATORY       │              │     LABORATORY       │
│                      │              │                      │
│ Calls for            │              │ Performs analysis    │
│ clarification        │              │                      │
└──────────────────────┘              └──────────────────────┘
                                                 ▲
                                       ┌──────────────────────┐
                                       │         SMO          │
                                       │                      │
                                       │ Requests reanalysis  │
                                       │ if needed            │
                                       └──────────────────────┘
```

```
┌──────────────────────┐  ┌──────────────────────┐  ┌──────────────────────┐
│     LABORATORY       │  │     LABORATORY       │  │     LABORATORY       │
│                      │  │                      │  │                      │
│ Sends hardcopy of    │  │ Sends invoice to SMO │  │ Sends COC and EDD to │
│ analysis to Data     │  │ tracking             │  │ Data Management      │
│ Validators and SMO   │  │                      │  │                      │
└──────────────────────┘  └──────────────────────┘  └──────────────────────┘
                                                                │
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                                                             ( C )
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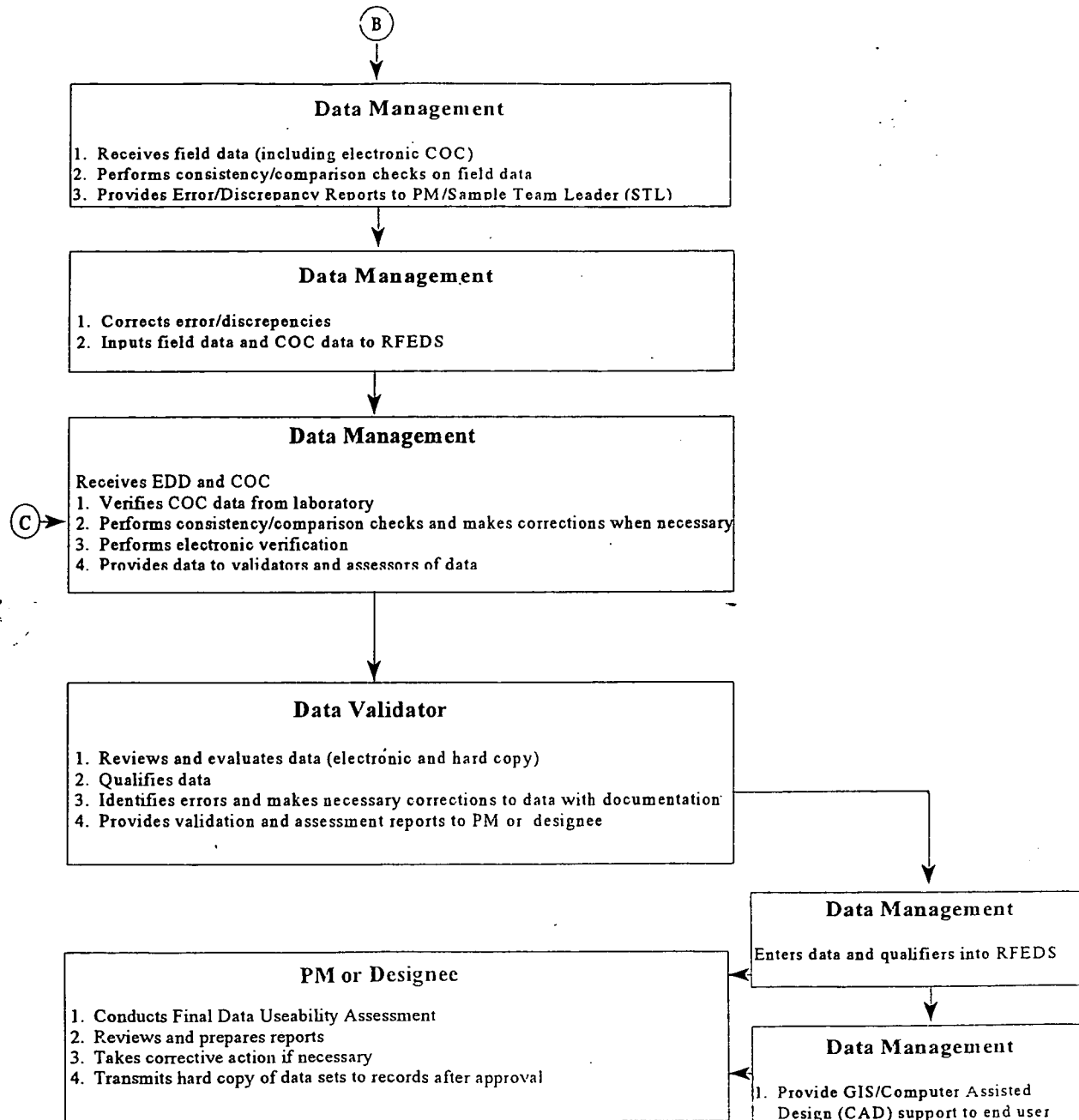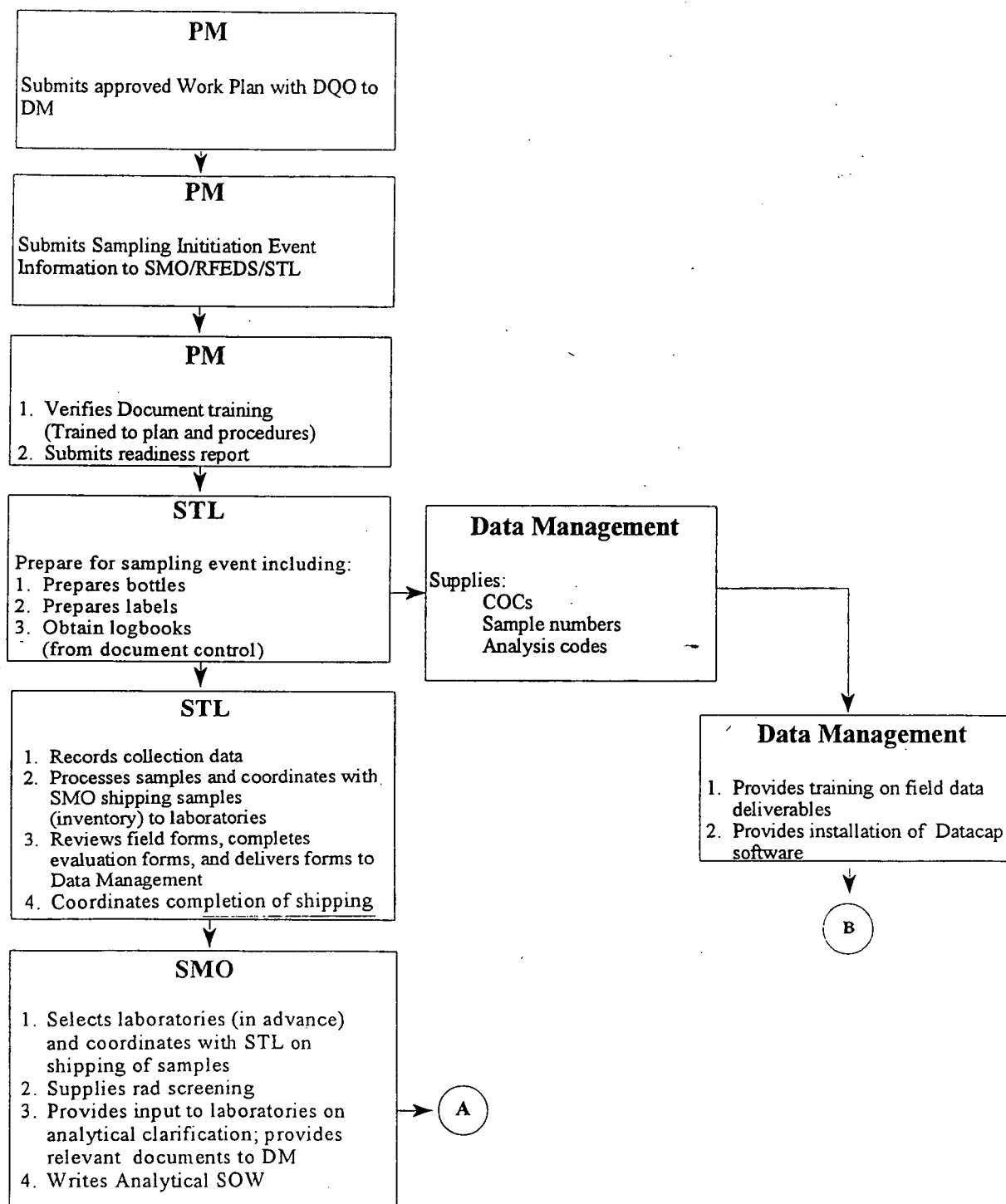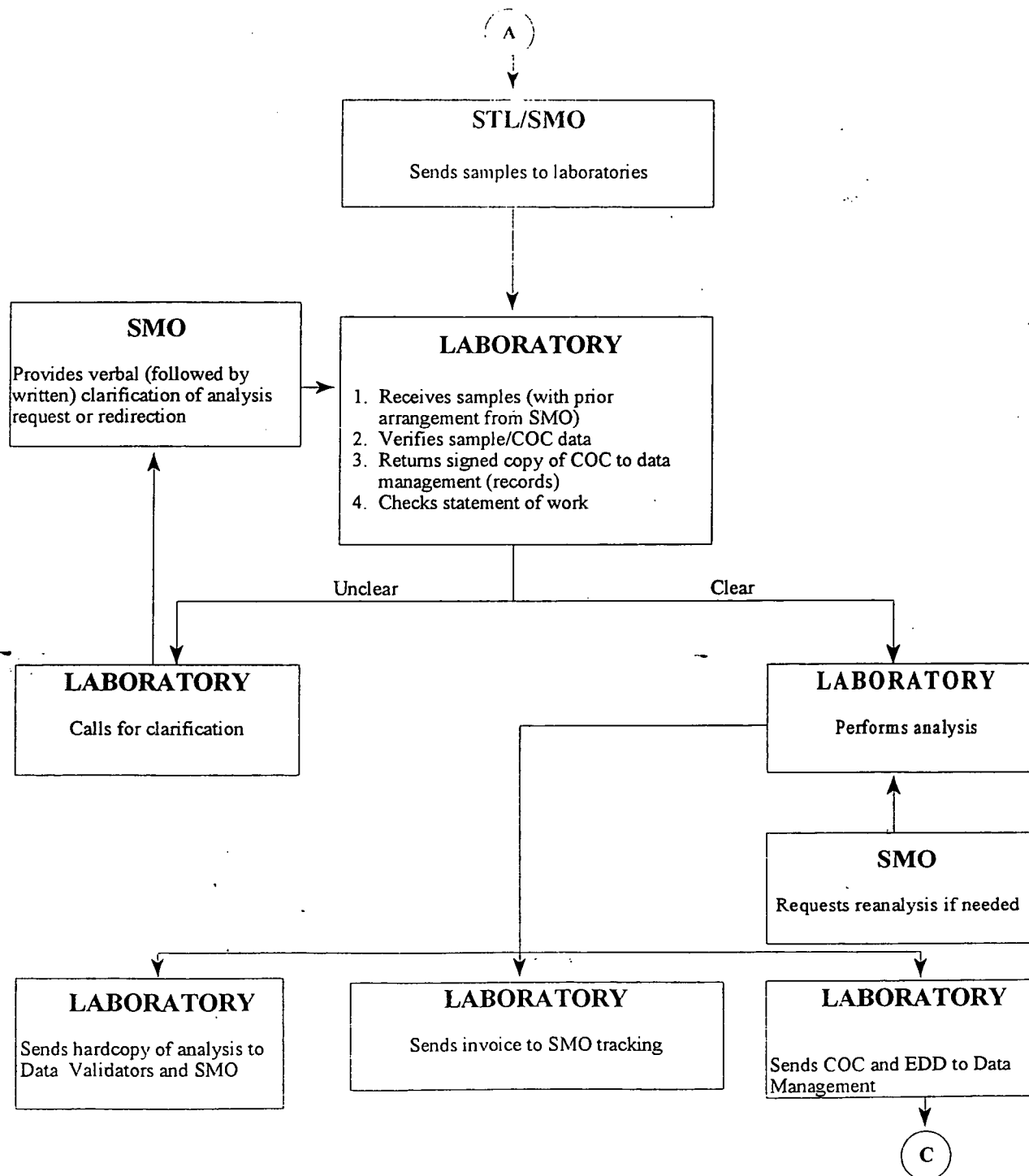
Figure 2-1. (continued) Data Management Flow Process

SECTION 3
DATA MANAGEMENT
RESPONSIBILITIES AND INTERFACES

3.0 DATA MANAGEMENT RESPONSIBILITIES AND INTERFACES

3.1 Functional Responsibilities

An overview of data management roles and responsibilities is provided in this section. The generalized functional accountabilities and interfaces flow chart for data management activities is shown in Figure 3-1. Each project or program is responsible for managing data within the participant organization and ensuring that data acquired by the participant are integrated into the data management system. This responsibility includes administrative requirements for the identification and control of data, data documentation, data use, data verification and validation, and data assessment. Each supporting organization is responsible for ensuring traceability and integrity of data from its original raw form through reduction and output presentation.
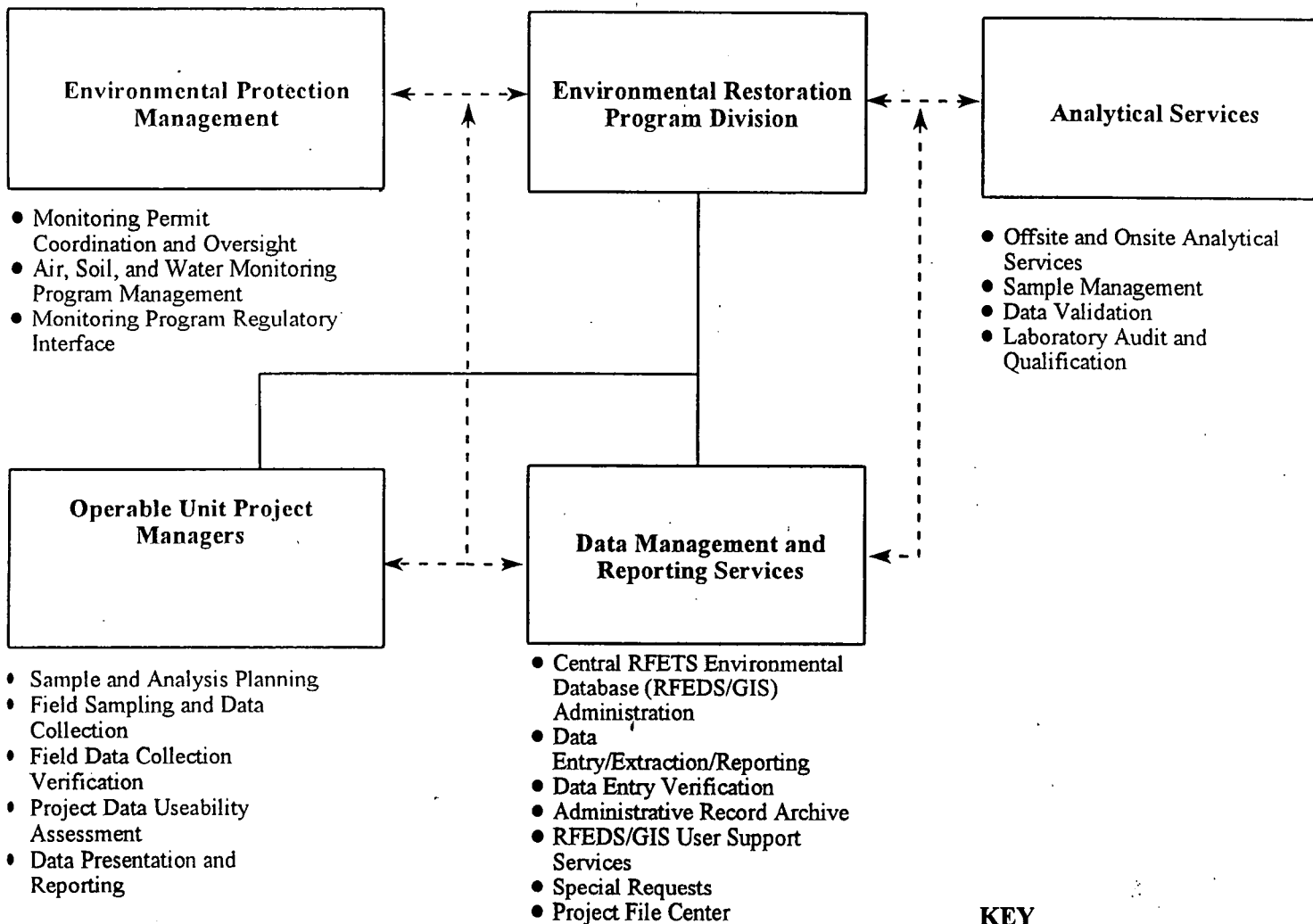
3.1.1 Project Managers

Program or Project Managers (PM) for environmental data are responsible for ensuring data integrity, quality, and usability. The PM is required to ensure that all data planning, collection, transmittal, reduction, and archive activities are conducted according to approved plans and procedures. Specific responsibilities include:

- Planning and implementing data collection efforts.

- Verifying that the sampling team is trained in controlling work documents.

- Documenting project planning in project or task-specific Work Plans or sampling plans and procedures.

- Providing sampling and analysis plans and procedures to the Data Management group prior to initiation of field sampling activities.

- Communicating changes in scope and problems to the appropriate support organization for disposition.

- Updating project status for QA readiness reviews, updating monitoring locations status, and reviewing and documenting final data quality or usability.

- Submitting sampling initiation events information to the SMO, DM, and the sampling team to initiate sample collection efforts.

3.1.2 The Data Management Group

DM is the organization that facilitates storage, management, and output of data generated for environmental programs. The DM group administers RFEDS/GIS, providing the central repository for electronic data supporting CERCLA, RCRA Facilities Investigation/Corrective Measures Study (RFI/CMS) activities, and environmental monitoring programs. Data Management provides specialists to consolidate, enter, extract, and report the data gathered to support a project or investigation. The data management specialists convert data to proper format and electronically or manually enter result information and related data such as conceptual models, monitoring locations, well and borehole activities, and sampling events. Data are initially received electronically, screened for contract and deliverable format compliance, and then uploaded, after approval, to the RFEDS/GIS.

Figure 3-1. RFETS Environmental DM Functional Responsibilities Diagram

Environmental Protection Management

- Monitoring Permit Coordination and Oversight
- Air, Soil, and Water Monitoring Program Management
- Monitoring Program Regulatory Interface

Environmental Restoration Program Division

Analytical Services

- Offsite and Onsite Analytical Services
- Sample Management
- Data Validation
- Laboratory Audit and Qualification

Operable Unit Project Managers

- Sample and Analysis Planning
- Field Sampling and Data Collection
- Field Data Collection Verification
- Project Data Useability Assessment
- Data Presentation and Reporting

Data Management and Reporting Services

- Central RFETS Environmental Database (RFEDS/GIS) Administration
- Data Entry/Extraction/Reporting
- Data Entry Verification
- Administrative Record Archive
- RFEDS/GIS User Support Services
- Special Requests
- Project File Center

KEY

———— Organization Reporting Relationship

◀ - - - ▶ Functional Interface

Specific responsibilities of DM personnel include:

- Providing COC numbers, sample numbers, location codes, analysis codes, and Field Data Capture (Datacap) codes.

- Training Program participants on system procedures and policies pertaining to data entry.

- Conducting compliance screening and consistency/comparison checks prior to accepting the data.

- Making any necessary corrections to the database.

- Coordinating retrieval, extraction, and distribution of data from the database.

3.1.3 Field Sampling Team

The STLs manage field sampling and data collection. The STL can be a PM, a subcontractor, or another representative designated by the PM. The STL receives direction from the PM and interfaces with the SMO and DM organization to ensure the traceability and integrity of the field sampling and data collection processes. STLs inventory samples collected in the field, verify information provided by the field team, coordinate completion of the COC and shipping documents, prepare and ship the samples, and deliver photocopies of the COC documents to the SMO. The field sampling team is also responsible for implementation of field data management procedures. Field sampling activities are conducted under the direction of a STL. Field Team responsibilities include:

- Entering pertinent information, documenting sample collection activities, describing locations, weather conditions and observations, documenting field instrument calibration, and recording field measurements and sample collection information.

- Coordinating data management activities and arranging for proper formatting and collection of data.

- Assigning RFEDS location codes to a monitoring or sample collection location, associating appropriate GIS (state plan) coordinates, and consolidating data for input. Data verifiers review measurement data and conduct verification activities to determine and document that data conform to specification requirements.

- Verifying field measurements and sample documentation, identifying, correcting, and recording any nonconformances.

After sampling, the field team coordinates shipment to the laboratories and delivers COC forms to DM; field data forms are delivered to the field Data Manager for input to Datacap. Field data management and sample management are detailed in the ERPD Operating Procedures. The STL obtains field logbook control numbers from the ERPD Document Control group.

3.1.4 Analytical Services Program Division

3.1.4.1 Sample Management Office The SMO coordinates contracts for analytical services and data validation. Specific responsibilities include:

- Generating the laboratory SOW with concurrence of ERPD.

- Conducting technical and QA audits of laboratories.

- Scheduling and approving laboratories to receive samples.

- Monitoring laboratory performance.

- Providing technical support to PMs and the field sampling team and evaluating and approving invoices.

3.1.4.2 Contracted Analytical Laboratories As described in the General Radiochemistry and Routine Analytical Services Protocol (GRRASP) SOW, the analytical laboratories under contract with the SMO are responsible to analyze samples as requested and provide data packages. The laboratories verify the requested analyses, perform the analyses, and send analytical results in the form of EDDs transmitted via modem or diskette for upload to RFEDS. Hard copies of analysis data (data packages) are sent to the ERPD Project File Center.

3.1.4.3 Onsite Analytical Laboratories Onsite analytical services directly supporting the environmental program are provided by the Building 881 General Laboratory and the Building 123 Radiochemistry Laboratory. The General Laboratory performs National Pollutant Discharge Elimination System (NPDES) permit compliance analyses for water quality and other specified permit parameters. The General Laboratory also supports the site waste management program, conducting analyses of regulated wastes, site spills, and special materials. The Building 123 laboratory conducts radiochemical analysis of soil, water, and air monitoring samples for isotopic concentrations of uranium, americium, plutonium and tritium. Both laboratories use the LIMS to enter and process result data. The LIMS system transfers result data to RFEDS electronically through the site VAX network.

3.1.4.4 Data Validators Data validators are responsible to assess the validity of analytical results. They review data packages from the laboratories, verify EDDs using the RFEDS compliance screening routines, verify tables of RFEDS analytical results, ascertain completeness of the data packages, and request any missing data from the laboratories. The validators associate codes of validity to the analytical results on EDDs, and forward the EDDs to RFEDS. Portions of the EPA Contract Laboratory Program (CLP) National Functional Guidelines for Inorganic and Organic Data Review and Radiochemical Data Validation Guidelines are used as guides for data validation. Data Validators perform a laboratory QC validation only; PMs assess field QC sample results and perform overall project useability assessments based on laboratory, field, and Project DQO assessments. Validation reports are submitted to the SMO and the ERPD.

3.1.5 Environmental Data Management and Reporting

The maintenance of adequate records is an essential element of the ER program management process. The Environmental Documentation Group of the Data Management and Reporting Services (DM&RS) Department is responsible for managing archive data that supports the ER Major System Acquisition (MSA) Project. Hard copies of all active physical data are captured, maintained, and stored in the ERPD PFC. The ERPD records system complies with the Site Centralized Records Management Program.

3.1.6 Quality Assurance

The Quality Assurance Program Manager (QAPM) is responsible for general QA oversight of all ERPD projects. This oversight includes identification of requirements, approval of procedures and plans, conduct of surveillances, and conduct of data QAs as outlined in the Quality Assurance Project Plan (QAPjP).

SECTION 4
DATA MANAGEMENT REQUIREMENTS
AND IMPLEMENTING PROCEDURES

4.0 DATA MANAGEMENT REQUIREMENTS AND IMPLEMENTING PROCEDURES

This section describes the technical and administrative requirements for the Site ERPD and its contractors relative to the collection, transfer, processing, storage, and use of environmental data. The ERPD Director is responsible to ensure these requirements are implemented through appropriate policies, approved procedures, hardware/software systems, qualified staff, and training. Key external requirements are listed in Figure 4-1. This figure lists the EPA and DOE requirements that address the twelve primary elements of an environmental data management system. On the following page, Figure 4-2 lists the internal ERPD procedures that implement the twelve primary elements of a data management system.

4.1 Data Requirements

4.1.1 Standard Data Values and DQOs

Standard values for environmental data fields are established by the PM. Procedures and check routines assess data quality against the standard values using a two-step method. The first step establishes standards for data entry, assuring that all entered values comply to specified data field length, field type (logic, alpha/numeric, etc.), range of accepted values, and format. For nonmeasurement data, such as analytical method number references, Chemical Abstract Service numbers, and sample numbers, this step includes tables of acceptable values used to check the validity of entered data against the standards. The purpose of the first step is to establish standards that ensure all data entry is of known quality. The second step establishes standards that allow evaluation of measurement data. For example, acceptable values of detection limit, precision, accuracy, completeness, and comparability are developed for a specific project/program, analytical method, analyte, and media type. The source of these values is the Project DQOs that have standard QC sample values. Standard data values are specified in the GRRASP, in project-specific QA plans, and technical memoranda.

4.1.2 Data Definitions

All information entered into RFEDS is defined in the data dictionary in terms of length and type, including a short narrative description of the data element purpose and use and origin. The RFEDS data dictionary is available from and maintained by the RFEDS User System Manager (USM) or Configuration Control Administrator (CCA).

4.1.3 Database Design

The database design is prepared by qualified personnel, reviewed for technical adequacy by a person who did not perform the original design, reviewed by the RFEDS USM for approval, controlled by a unique revision release number, and documented. The database design documentation will contain technical and management review and approval signatures, file structures, data element relationships, data flow models, and other information pertinent to the use and understanding of the database design and structure. The design review ensures that the database design satisfies identified needs and objectives. The Information Resources (IR) Department is responsible for preparing and providing technical review of database designs. The DM CCA is responsible to maintain a current and historical revision history of the database design.

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REQUIREMENT SOURCES	Sample and Analysis Plan Development	DQO Development	Field Sampling	Sample Tracking and Status Reporting	Analytical Methods and Levels	Data Validation Methods and Levels	Data Verification	QA Plans	Data Qualification and Usability	Investigation results and reporting formats	Records management and retention	Control of Electronic Databases
DOE 1324.2A, Records Disposition											●	
DOE 1324.5A, Records Management											●	
DOE 4700.1, Project Management											●	
DOE 5700.6C, Quality Assurance				●				●			●	●
CERCLA (Public Law 96-510)											●	
Office of Solid Waste and Environmental Restoration (OSWER) Directive 9028.00a, Practice Paper for Data Management Life Cycle											●	
EPA/540/G-90/008, Guidance for Data Useability in Risk Assessment									●			
EPA540-R-93-071, Data Quality Objectives Process for Superfund	●	●	●			●		●				
EPA540-R-93-078, Data Quality Objectives Process for Superfund-Workbook	●	●	●			●		●				
OSWER 9355.301, Guidance for Conducting RI/FSs Under CERCLA	●	●	●	●	●	●		●	●	●	●	
RFETS, General Radiochemistry and Routine Analytical Services Protocol Parts A & B (GRRASP)					●		●					
Federal Facility Compliance Agreement for RFP [RFP Interagency Agreement (IAG)]											●	
DOE-RFFO Management Procedures and Requirements (MPR), Section 3: Quality Assurance Requirements and Description (QARD)	●	●	●	●				●				
DOE-RFFO Management Procedures and Requirements (MPR), Section 5: Data Management Requirements		●	●				●		●		●	●
EPA QAMS-005/80, Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans	●	●	●	●		●	●	●	●	●	●	
RFP Environmental Restoration Site-Wide Quality Assurance Project Plan (QAPjP)	●	●	●	●	●	●	●	●	●	●	●	●

Figure 4-1. Data Management Requirements/Program Elements Cross-Reference.

Cross-reference matrix — **IMPLEMENTING ERPD PLAN, PROCEDURE OR TASK** (columns) vs. Data Management Program Elements (rows). ● = filled, ○ = open.

Program Element	ADM 05.03 RFI/RI Work Plan Development	ADM 06.04 Map Control	ADM 08.01 Control and Identification of Items, Samples, and Data	ADM 08.02 Evaluation of ERM Data for Usability in Final Reports	ADM 08.03 Graded Validation	ADM 08.05 Contract Compliance Screening	ADM 17.01 Records Capture and Retention	ADM 17.02 Administrative Records Screening and Processing	ADM 17.09 Records Identification, Preliminary Preparation and Creation	ADM 19.01 Software Management Plan	3-Q75-ER-DM-01 RFEDS Configuration Control	Operating Procedures Manual, Volumes I Through VI	EPA Functional Guidelines, GRRASP, Subcontractors DV Procedures	Quality Assurance Program Description	Task 6.4.1 Develop and Implement Supporting Software Management Plan (SMP) Procedures	Task 6.4.2 Develop and Implement Transmittal and Verification Procedure
Control of Electronic Databases										●	●			●	○	
Records Management and Retention							●	●	●	●		●		●		
Investigation Results and Reporting Formats	●									●				●		
Data Qualification and Usability				●									●	●		
QA Plans														●		
Data Verification						●										○
Data Validation Methods and Levels					●							●	●	●		
Analytical Methods and Levels													●	●		
Sample Tracking and Status Reporting			●									●		●		
Field Sampling	●											●		●		
DQO Development	●													●		
Sample and Analysis Plan Development	●													●		

Figure 4-2. Data Management Program Elements/Implementing Procedures Cross-Reference.

4.1.4 Data Classification

All environmental data will be reviewed for classification in accordance with DOE Order 0000.1A, Standard Subject Classification System. Standard categories such as Classified, Unclassified Controlled Nuclear Information (UCNI), or Unclassified Data are assigned to the database. It is anticipated that all Site environmental data are unclassified and are further identified and labeled as "public information." It is the DM organization's responsibility to evaluate the need for clarifying Project data classification status. All data labeled as public information will be made readily available to the public at large after prior written consent by the RFEDS USM and the PM.

4.1.5 Data Entry/Transfer Verification

Clerical procedures and/or computer programs verify correct and accurate data entry and transfer. All data entered into the RFEDS database is verified as accurate and complete. Verification consists of independent review of data consistency by comparing entered data to data entry sources, such as data collection forms, printouts, "flat files" or other sources, or by verifying computer programs. Data that are determined accurate and complete are accepted and posted to the master RFEDS database.

4.1.6 Electronic Data Access Control

Access to the computer system and data will be authorized and controlled using passwords. User access will be classified as select (read only), update, insert, or delete. The access will be further limited, as necessary, to specific input modules of the database. The RFEDS USM will authorize user access and will maintain a current listing of users and access designations. Finally, a tracer log of system access will be established so that unauthorized access attempts can be researched. The Computer Systems Security Officer is responsible for providing oversight and compliance to the computer system security requirements.

4.1.7 Data Set Reduction - Qualification for Output

Data sets received from data collection operations contain comprehensive information that includes duplicate results due to laboratory dilutions, tentatively identified compound, various analytical detection limits, records labeled as rejected, QC sample records, and others. Prior to use of the data set for risk assessment, monitoring status, or site characterization, the unneeded information is removed from the data set. This process is the first step in data set reduction and results in a data file qualified and ready for further analysis, reduction, and output. The resulting preferred information is an ordered, qualified, and verified data set without extraneous information. The reduction/qualification process identifies the single preferred record per analyte in the data set. The criteria and methods for data set qualifications are referenced in internal ERPD procedures.

4.1.8 Data Set Reduction Verification

Environmental PMs are responsible for data set reduction and qualification for output. This task is typically conducted by staff scientists or subcontract specialists. All personnel performing data set reduction and qualification for output are required to confirm that the reduction/qualification process did not alter analyte results. This is accomplished by performing a check routine to verify that results in the qualified data set match those results in the RFEDS repository. Subcontractors reducing data for output reports must submit a diskette and relevant documentation of the final data set to RFEDS for verification and to be archived.

4.2 Data Storage, Retrieval, and Archiving/Filing

4.2.1 Database, Applications, and Data/Configuration Control

The structure, application programs, and contents of the database will be configuration controlled. Configuration control is defined as establishing a baseline configuration, assigning unique control numbers to the database and each major module of the database, and allowing only approved, authorized changes to database software, hardware, and structure. Changes to configuration will be documented and approved by an authorized CCA. A documented, indexed, and retrievable revision history of all changes is maintained to provide the ability to track all changes back to original values, structures, or software code. The CCA reports functionally to the RFEDS USM and is responsible for controlling, reviewing, authorizing, implementing, and documenting changes to the environmental database.

4.2.2 Electronic Data Backup and Recovery

Computer software and hardware used to maintain, index, access, and store data will be controlled to ensure protection from loss or damage as well as ensure accountability and retrievability. Procedures such as routine file backup and use of secondary storage media will be developed and employed. The IR Department is responsible for establishing and maintaining procedures that protect database integrity against data loss.

4.2.3 Electronic Data Archival and Retention

Data retention is governed by General Records Schedules, which are issued by the National Archives and Records Administration. In addition, data that support ERPD have specified archive requirements. In accordance with the Interagency Agreement (IAG), data must be archived for at least ten years after termination of the agreement. All environmental data will be indexed and readily retrievable on an as-needed basis. Data indexing will be in logical keys that are appropriate to facilitate retrieval, such as program name, site or location, time frame, type of data, parameter group. The RFEDS USM is responsible for archiving and retaining all RFEDS environmental data in an indexed and readily retrievable manner.

4.3 Software Development Quality Assurance

Software programs developed to store, process, tabulate, or reduce environmental data on a routine basis will be systematically developed, approved for use, and configuration controlled. Procedures will address the controls for elements of software development, including functional requirements definition and approval; design preparation, review and approval; test plan development and approval; testing and test results documentation; configuration control of database structures and application programs; and final approval for use of software programs. Each significant revision to a software program or a supporting database will be described in terms of functional requirements, planned inputs/outputs, program designs, test and installation procedures, system documentation; and user training. Requirements for software QA/QC will be applied on a graded approach: more rigorous controls are applied to large or complex systems that have significant risks of failure, and less rigor is applied to less complex or simple systems where system failure has little impact. The RFEDS USM and the supporting IR staff are responsible to implement effective software QA/QC procedures for RFEDS software.

SECTION 5
DATA OUTPUT AND RETRIEVAL

5.0 DATA OUTPUT AND RETRIEVAL

The GIS/RFEDS environmental data management system provides extensive data analysis tools. These tools facilitate data interpretation and provide visual output depicting the nature and extent of hazardous substance contamination at the Site. The RFEDS/GIS is fully capable of presenting column, matrix, and volumetric data using tabular, visual, and numerical analysis techniques. These capabilities include modeling the current and predicted extent of contamination in surface and subsurface soils and waters. Geographical, geological, geophysical and man-made site improvement data are stored in the RFEDS/GIS databases to facilitate relational comparison to site characterization data. This collection of tools is used by PMs to interpret and present data supporting site investigation, risk assessment, remediation, and land use decisions.

5.1 Data Output Processing

All RFEDS/GIS outputs are processed to Program and Project guidelines. The following procedural requirements encompass RFEDS/GIS output processing:

- The content and accuracy of all RFEDS/GIS outputs will be assessed and approved by the appropriate PM.

- Output deliverables will be reviewed and approved by qualified project personnel by evaluating all elements of the data management process, including data collection, transfer, reduction, verification, validation, and numerical analysis techniques employed.

5.2 Interactive User Interfaces

The Data Management group is responsible for developing interactive programs that will provide environmental data users with easily accessible outputs. The user interface program will provide access to raw data, reduced and qualified data, and GIS maps and graphics. The interface will be menu driven, with built-in help features and have "point and click" functionality, which means that the interface module will be designed so that minimal user training is needed.

SECTION 6
DEFINITION OF TERMS

6.0 DEFINITION OF TERMS

Custody: Physical data are considered in custody if possession of the data can be traced from the time of collection until the data are introduced as evidence in legal proceedings.

Data assessment: A process of using validated data to evaluate environmental conditions with identifiable levels of confidence. The process considers variability contributed from all the sources across sampling and analytical steps back to site-specific data quality objectives.

Database: An integrated collection of computerized data files whose records cross-reference one another and associated software for addition, update, retrieval, and output of data.

Datacap: Software that captures field data in electronic form for input to RFEDS. The Datacap User's Guide defines the data elements.

Data model: Describes the relationship between data entities identified in a data requirement specification.

Data qualifiers: Code letters (V-valid, A-acceptable with qualifications, R-rejected) assigned to analytical data and results based on the assessment of their quality and appropriateness for use as intended.

Data Quality Objectives (DQOs): Statements that outline the decision-making process and specify the type, quality, and quantity of data required to support decisions.

Data package: Includes analytical results, raw data, and the associated QC data for analysis of field samples from one project received at the analytical laboratories in a specified time period, or consisting of a specified number of samples from the project, whichever comes first.

Data products: Tabular reports, statistics, graphs, maps, or subsets of data in formats generated by retrieving and processing data from the database.

Meta-data: Information about measurement data that helps to define data usability and associated context.

Method validation: A review of measurements and analytical laboratory results to confirm that the requirements of the analytical method are met.

Project Manager (PM): A designated person responsible for the preparation and implementation of an environmental project.

Sample: Physical evidence collected from a site or the environment for investigative or monitoring purposes.

SPARCC parameters: Sensitivity, precision, accuracy, representativeness, completeness, and comparability of data.

Validation: Third-party evaluation, against defined criteria, of the technical aspects of sampling, handling, field measurements, and laboratory analysis for problems that could affect the validity or usability of the analytical result.

Verification: The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements.

APPENDIX A
BIBLIOGRAPHY

DOE, 1994, *Data Management Requirements; Section 5, Management Procedures and Requirements*; U.S. Department of Energy Rocky Flats Plant Environmental Restoration.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities - Development Process*, EPA/540/G-87/003 (OSWER Directives 9355.0-7B).

EPA, 1990, *Guidance for Data Useability in Risk Assessment*, EPA/540/G-90/008.

EPA, 1993, *Quality Assurance for Superfund Environmental Data Collection Activities*, 9200.2-16FS.

EPA, 1993, *Guidance for Planning for Data Collection in Support of Environmental Decision Making Using the Data Quality Objectives Process, Interim Final*, Office of Research and Development, Washington, D.C., EPA QA/G-4.

EPA, 1994, *The Data Quality Objectives Process*, EPA QA/G-4.

EG&G, 1994, *Evaluation of ERM Data for Usability in Final Reports*, 2-G32-ER-ADM-08.02.

EG&G, 1991, *Environmental Restoration Sitewide QA Project Plan*.

EG&G, 1991, *General Radiochemistry and Routine Analytical Services Protocol Parts A & B (GRRASP)*, EG&G Rocky Flats, Golden, CO.

EPA, 1987, *Data Quality Objectives for Remedial Response Activities - Development Process*, EPA/540/G-87/003 (OSWER Directives 9355.0-7B).

RFP, 1994, *Evaluation of ERM Data for Usability in Final Reports*, 2-G32-ER-ADM-08.02.

APPENDIX B
ACRONYMS AND ABBREVIATIONS

ARAR   Applicable or Relevant and Appropriate

CAD   Computer Aided Drafting

CCA   Configuration Control Administrator

CDPHE   Colorado Department of Public Health and Environment

CERCLA   Comprehensive Environmental Response, Compensation, and Liability Act

CLP   Contract Laboratory Program

COC   chain-of-custody

DM   Data Management

DM&RS   Data Management and Reporting Services

DOE   U.S. Department of Energy

DQO   Data Quality Objective

EDCN   Environmental Data Collection Network

EDD   Electronic Data Deliverable

EPA   Environmental Protection Agency

EPM   Environmental Protection Management

ER   Environmental Restoration

ERPD   Environmental Restoration Program Division

ERM   Environmental Restoration Management

FSP   Field Sampling Plan

GIS   Geographic Information System

GRRASP   General Radiochemistry and Routine Analytical Services Protocol

IAG   Interagency Agreement

IR   Information Resources

IR/E&RTS   IR/Environmental & Real Time System

LIMS   Laboratory Information Management System

MSA   Major System Acquisition

NPDES   National Pollutant Discharge Elimination System

OSWER   Office of Solid Waste and Environmental Restoration (EPA organization)

PFC   Project File Center

PM   Project Manager

QA   Quality Assurance

QAA   Quality Assurance Addendum

QARD   Quality Assurance Requirements and Descriptions

QAPjP   Quality Assurance Project Plan

QAPM   Quality Assurance Program Manager

QC   Quality Control

RCRA   Resource Conservation and Recovery Act

RDBMS   Relational Database Management System

RFEDS   Rocky Flats Environmental Database System

RFESTS   Rocky Flats Environmental Technology Site

RFI/CMS   RCRA Facilities Investigation/Corrective Measure Study

RFFO   Rocky Flats Field Office

SAP   Sampling and Analysis Plan

SMO   Sample Management Office

SPARCC   Sensitivity, precision, accuracy, representativeness, completeness, and comparability

STL   Sample Team Leader

SOW   Statement of Work

TCP/IP   Transmission Control Protocol/Internet Protocol

TI   1.544 megabits persecond throughput rate telephone link line through Regional Bell Operating Company (RBOC)

UCNI   Unclassified Controlled Nuclear Information

USM   User System Manager